

UTILIZATION OF NATIONAL WEATHER SERVICE GIS DATA

Thanks for
having me!



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National Weather Service-Bismarck



Weather Forecast Offices (122)



Mission Statement...

The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the protection of life and property.

- Open 24 hours a day....365 days a year
- Daily forecasts
 - Includes 7-day forecast, aviation, fire weather, etc...
- High Impact Weather Events

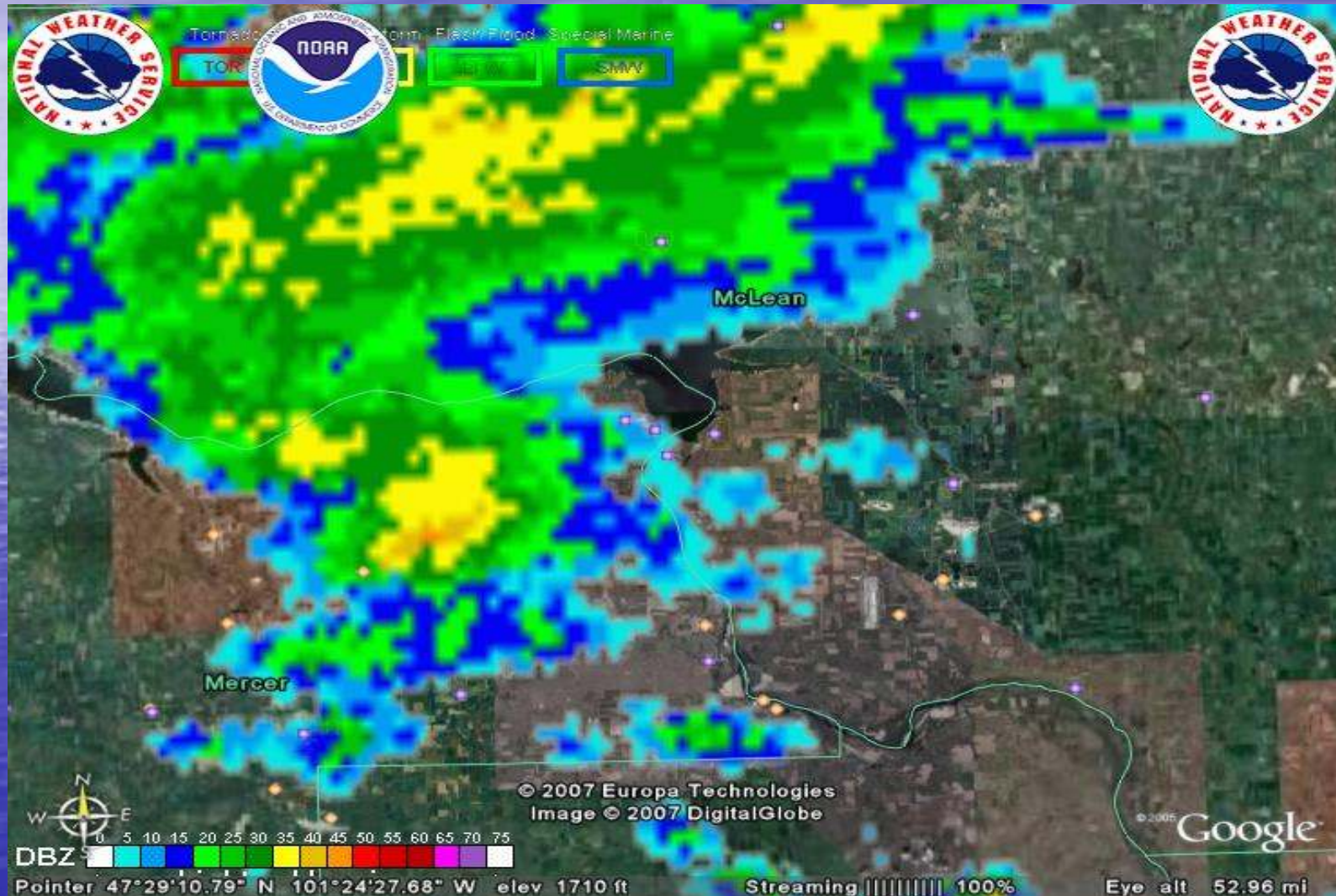
Winter Severe Weather



Summer Severe Weather



Weather Related GIS Datasets



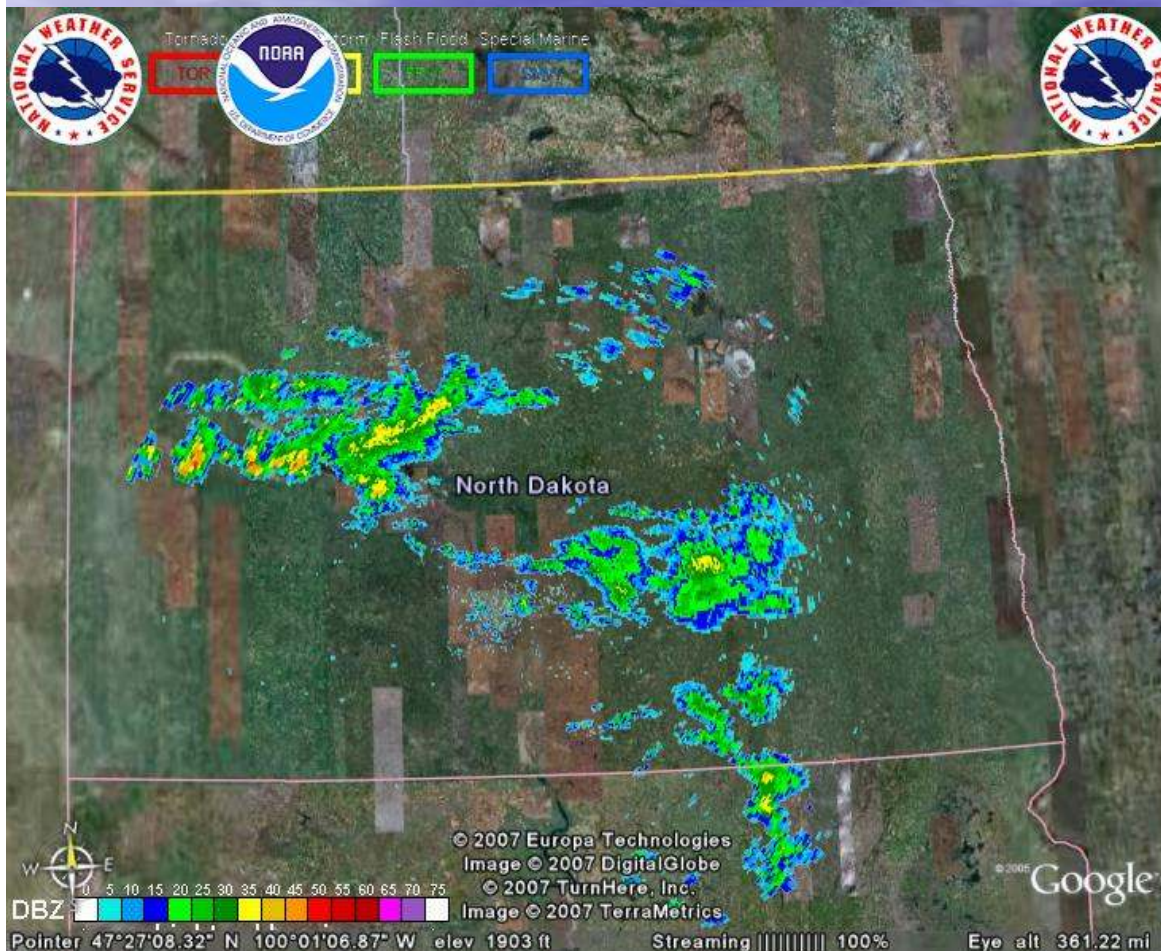
Weather Related GIS Datasets

- Weather related GIS datasets are created daily by the National Weather Service and other state and federal agencies
 - COOP, NDAWN, DOT, APRS and ASOS surface weather reports (to name the majority)
- Hydrology GIS datasets also created daily
 - USGS River data, rainfall and snowfall reports, moisture content of snowpack, etc...
- Plethora of static maps exist as well

Weather Related GIS Datasets (cont)

- Certain GIS datasets are created exclusively by the National Weather Service
 - Doppler Radar Imagery
 - NDFD gridded data
 - Storm data (winter and summer severe weather)
- Let's Focus on these more!!

RIDGE enhanced views of Doppler Radar Imagery (Radar Integrated Display with Geospatial Elements)



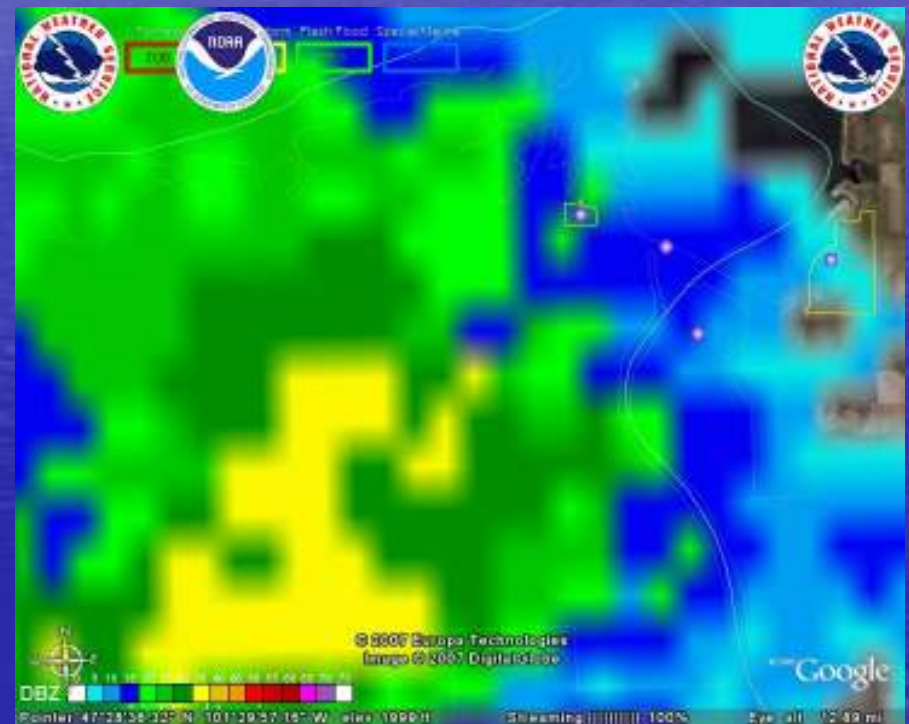
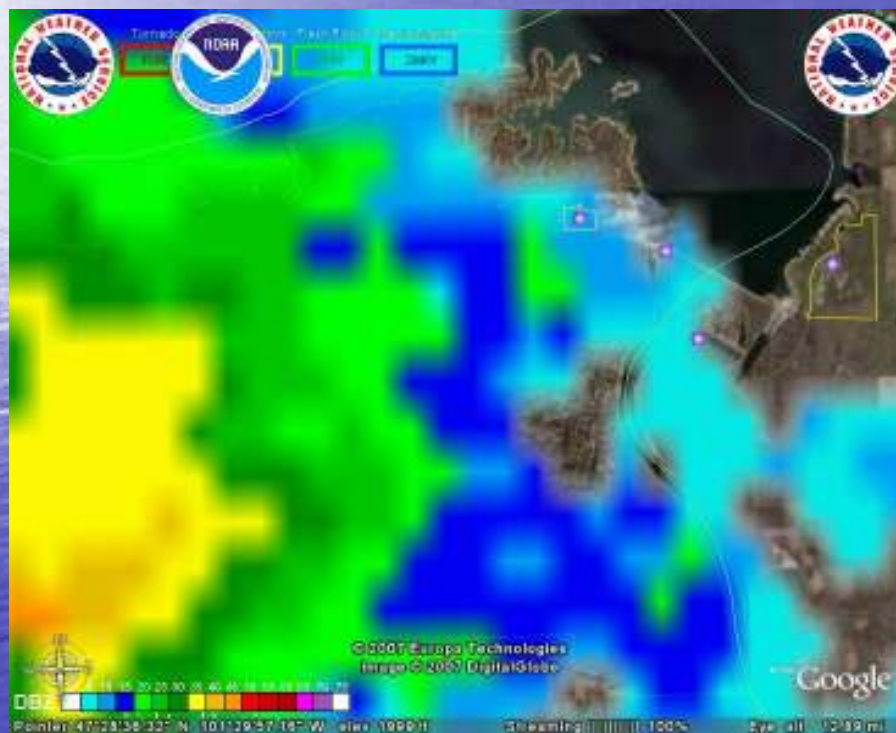
- Each RIDGE radar image created without backgrounds
- Standard geographic projection
- Can import with GIS software and layer to geospatial elements
- File formats include KMZ/KML and gif (with attached world file)

Google Earth Example using KMZ files



Automatically update as new RIDGE images are created via KML/KMZ files.

Newer versions of Google Earth support looping of data.



Google Earth Example....(cont.)

How to get RIDGE datasets...



Dakota Skies

GIS

NWS GIS page

Using NDFD data

Radar GIS use

Fire Weather

Local Fire Weather

Fire WX Briefing

Contact Us

Webmaster

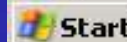
Feedback



NOAA's National Weather Service
Bismarck, ND Weather Forecast Office

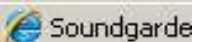
2301 University Drive, Building 27
Bismarck, ND 58504
701-250-4224

<http://radar.weather.gov/GIS.html>



Inbox for Natha...

NWS Bismarck...



www.weather.gov/bis

By State/County
UV Alerts
more...

Observations
Doppler Radar
Satellite
Snow Cover
Surface Weather
Observed Precip
more...

Forecasts
By Local Office
Graphical
Aviation Weather
Marine Weather
Hurricanes
Severe Weather
Fire Weather
Numerical Models
Statistical Models
more...

Text Messages
By State
By Message Type
National

Climate
Past Weather
Predictions

Weather Safety
Weather Radio
Hazard Assessment
StormReady
TsunamiReady
more...

Education/Outreach

Each of the RIDGE radar image has a "world file" associated with it. A world file is an ASCII text file associated with an image and contains the following lines:

Line 1: x-dimension of a pixel in map units
Line 2: rotation parameter
Line 3: rotation parameter
Line 4: NEGATIVE of y-dimension of a pixel in map units
Line 5: x-coordinate of center of upper left pixel
Line 6: y-coordinate of center of upper left pixel

If the image file name has a 3-character extension (image1.gif), the world file has the same name followed by an extension containing the first and last letters of the image's extension and ending with a 'w' (image1.gfw).

Loading Images into GIS Software

For KML/KMZ supporting applications:

Load RIDGE Radar images and NWS warning polygons using KML/KMZ. Go to the page that generates KML/KMZ files for your application that uses KML/KMZ. <http://radar.weather.gov/ridge/kmzgenerator.php>

For individual Radar sites:

1. Go to the directory where the radar images reside: <http://radar.weather.gov/ridge/radarimg/>
2. Select an image directory:
 - o NOR = Reflectivity
 - o N1P = 1 Hour Precipitation
 - o NTP = Storm Total Precipitation
 - o NOV = Velocity
 - o NOS = Storm Relative Motion
 - o NOZ = Long Range Reflectivity
3. Save both the image of the radar (file ending in ".gif") and the **world file** (ending in ".gfw") that goes with it to a computer in the same directory. (The "_0" in the file name indicates that this is the latest image.)
4. Load the image into a GIS as any other layer.

This process can be repeated for the warning polygons (<http://radar.weather.gov/ridge/Warnings/Short/>) and all other layers on the RIDGE pages (<http://radar.weather.gov/ridge/Overlays/Short/>)

Done



Inbox for Natha...

National Weat...

Audioslave / Ou...

ArcMap RIDGE -...

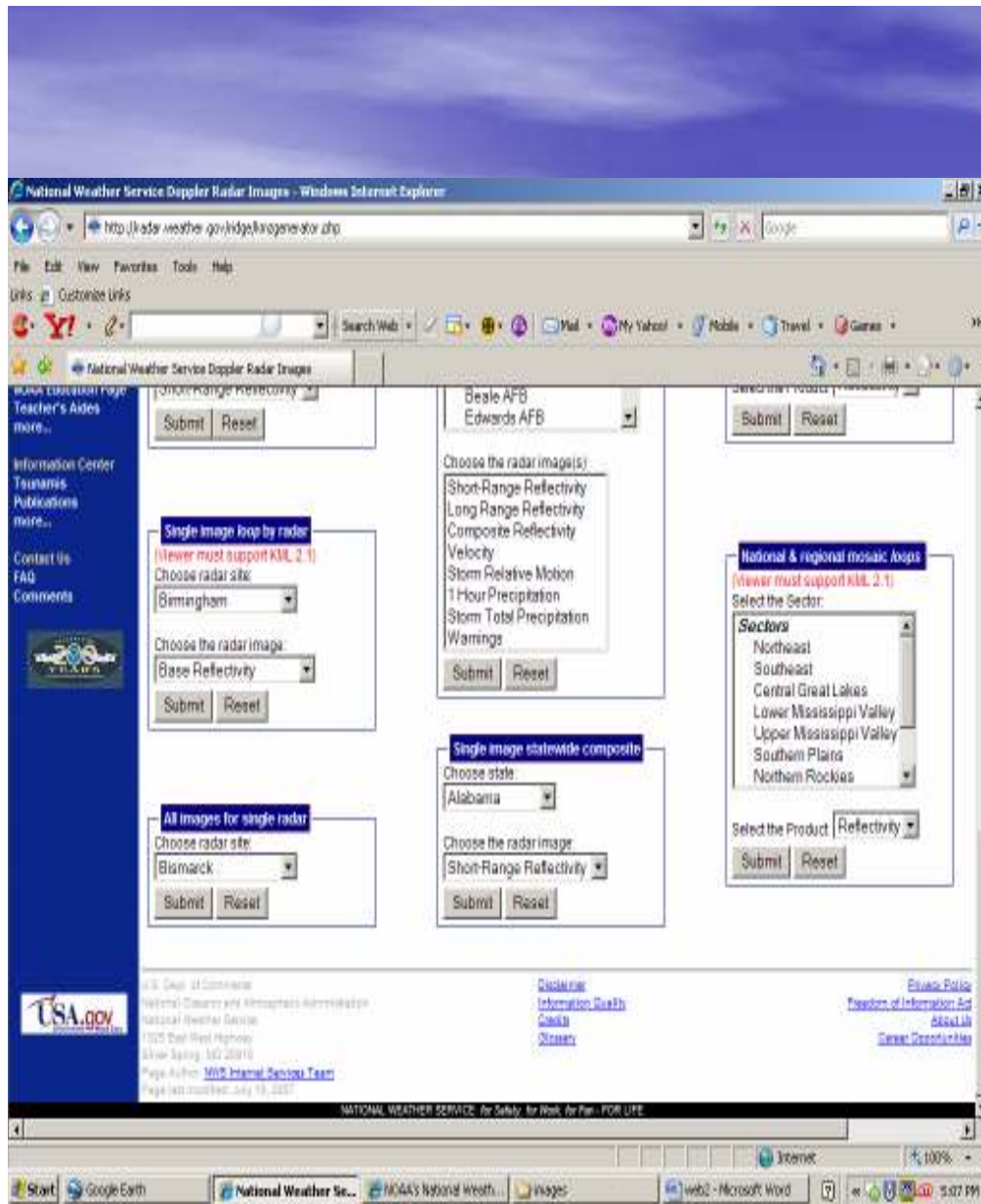
Microsoft Power...

Untitled - ArcMa...

images

Internet 100%

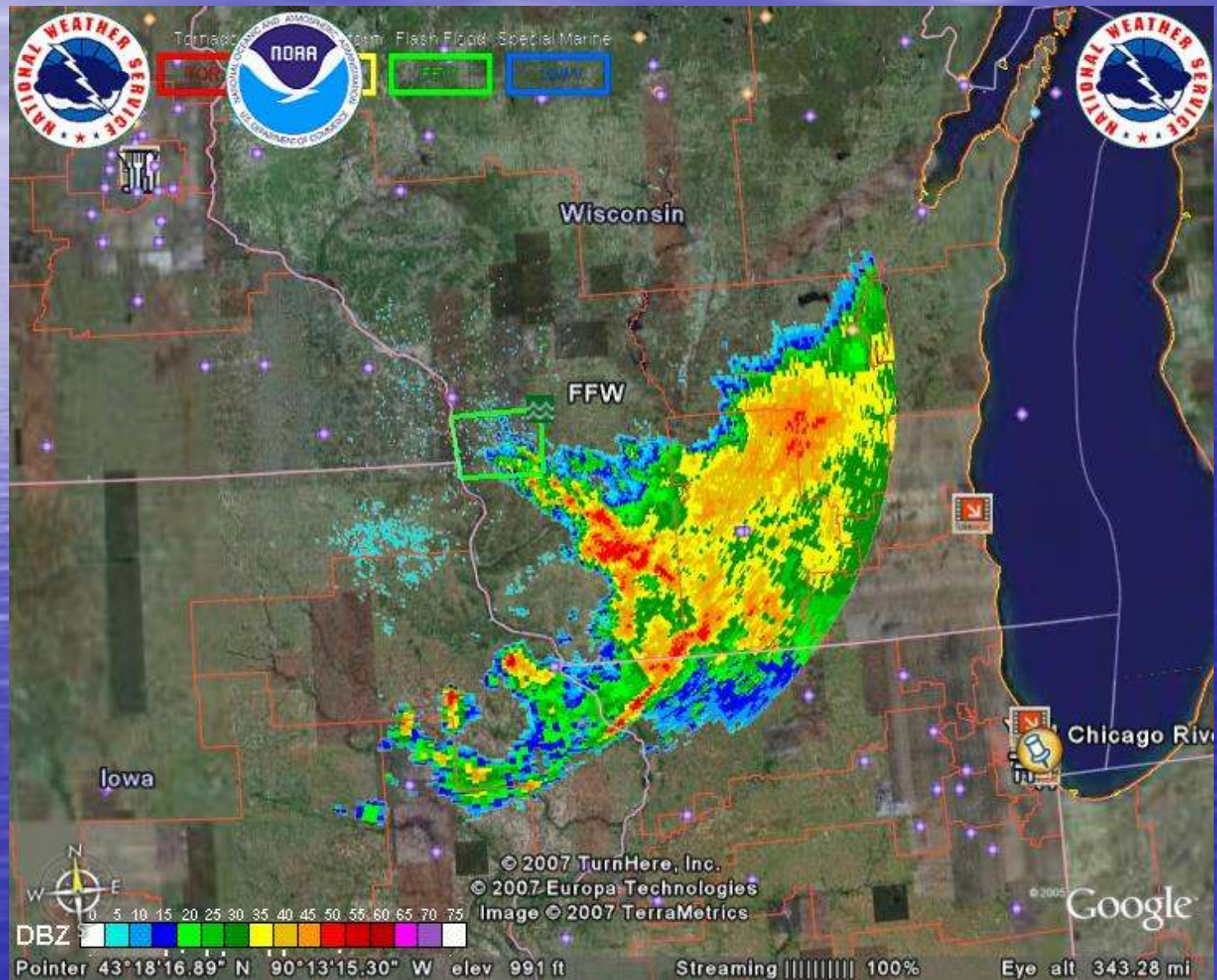
3:42 PM



- Local or Regional radar imagery
 - Reflectivity
 - Velocity
 - Precipitation Estimates
 - Etc...
- Warning Box + text

<http://radar.weather.gov/ridge/kmzgenerator.php>

Example...



Example...(cont.)

Google Earth
File Edit View Add Tools Help

Fly To **Local Search** **Directions**

e.g. 37 25.818' N, 122 05.36' W

Places

- ☒ **FFW**
FLASH FLOOD WARNING
WIC123-271645-
- ☒ **FFW**
FLASH FLOOD WARNING
AZC005-271645-
- ☒ **FFW**
FLASH FLOOD WARNING
UTC021-025-053-271730-
- ☒ **FFW**
FLASH FLOOD WARNING

Layers

- ☒ **Layers**
- ☒ **terrain**
- ☒ **Geographic Web**
- ☒ **Featured Content**
- ☐ **Global Awareness**
- ☐ **roads**
- ☐ **3D Buildings**
- ☒ **borders**
- ☐ **Populated Places**
- ☐ **Alternative Place Names**
- ☒ **Dining**
- ☒ **Lodging**
- ☐ **Google Earth Community**
- ☐ **Shopping and Services**

FFW

FLASH FLOOD WARNING
WIC123-271645-

BULLETIN - EAS ACTIVATION REQUESTED
FLASH FLOOD WARNING
NATIONAL WEATHER SERVICE LA CROSSE WI
851 AM CDT MON AUG 27 2007

THE NATIONAL WEATHER SERVICE IN LA CROSSE HAS ISSUED A

- * FLASH FLOOD WARNING FOR...
- VERNON COUNTY IN SOUTHWEST WISCONSIN

- * UNTIL 1145 AM CDT

- * AT 851 AM CDT...NATIONAL WEATHER SERVICE RADAR DETECTED THUNDERSTORMS PRODUCING VERY HEAVY RAIN ACROSS MUCH OF THE WARNED AREA. ESTIMATES FROM RADAR INDICATED THAT 2 TO 3 INCHES OF RAIN HAS FALLEN DURING THE PAST 2 HOURS OVER THE WARNED AREA.

- * SOME LOCATIONS THAT MAY BE AFFECTED INCLUDE...COON VALLEY...STODDARD...VIROQUA...WESTBY AND HIGHWAY 82 AND COUNTY D.

WITH MOIST SOILS FROM LAST WEEKS RAINS AND CONTINUED HEAVY RAIN REDEVELOPING OVER WESTERN VERNON COUNTY...SOME CREEKS COULD RISE OUT OF THEIR BANKS THIS MORNING. ALSO...STEEP BLUFFS COULD POSE A RISK OF MORE MUDSLIDES WHICH COULD AFFECT ROAD TRAVEL.

THOSE ALONG CREEKS IN VERNON COUNTY SHOULD MONITOR THEM CLOSELY FOR RAPID RISES. THOSE CLEANING UP THE HISTORICAL FLOODING AUGUST 18 SHOULD BE CAREFUL OF LIGHTNING IF OUTDOORS.

DBZ 0 5 10 15

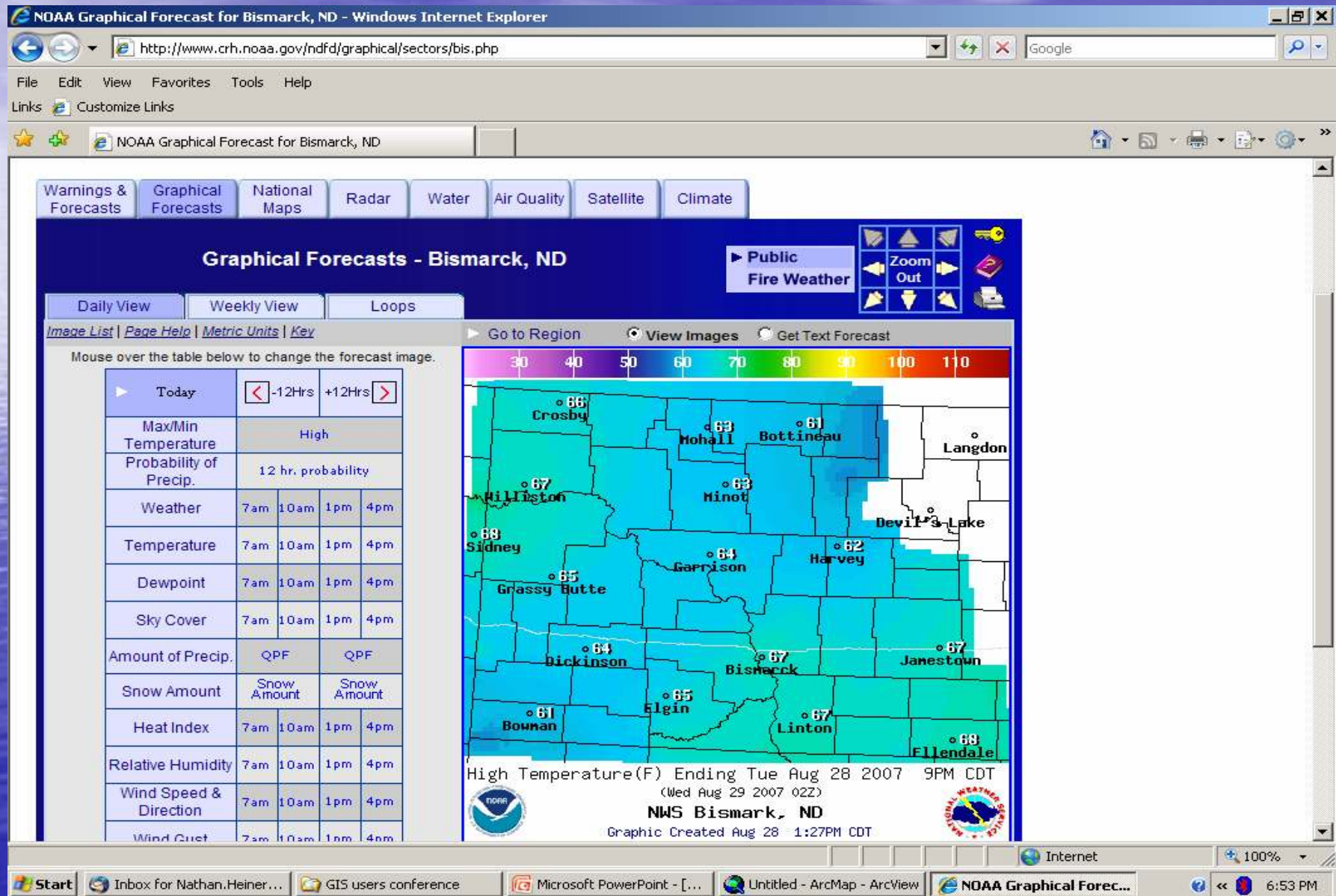
Image NASA

Pointer 43°34'04.41" N 90°24'29.83" W elev 1163 ft Streaming 100% Eye alt 343.28 mi

☐ Lodging ☒ Dining ☐ Roads ☒ Borders ☒ Terrain ☐ Buildings

Start Google Earth 3:54 PM

NDFD (National Digital Forecast Database) gridded data



How to download NDFD gridded data into shapefile format



http://www.weather.gov/ndfd/gis/ndfd_GIS_tutorial.html

http://www.weather.gov/ndfd/gis/ndfd_tutorial.pdf

Using NDFD gridded data in a GIS Environment (Shapefiles and Floating Point Grids) - Windows Internet Explorer

http://www.weather.gov/ndfd/gis/ndfd_gis_tutorial.html

File Edit View Favorites Tools Help

Links Customize Links

Using NDFD gridded data in a GIS Environment (Shap...

Tutorial: Using NDFD gridded data in a GIS Environment (Shapefiles and Floating Point Grids)

[Why bring NDFD grids into a GIS?](#) | [Using NDFD grids for pre-hurricane landfall decision making](#) | [Download the data](#) |
[Convert the data to an ESRI shapefile](#) | [Import an ESRI shapefile into ArcGIS](#) |
[Load Legends into ArcMap to view GRIB2-derived shapefiles](#) | [Convert a message to ESRI Spatial analyst or GrADS file format](#) |
[Open an FLT file in ArcGIS](#)

Why bring NDFD grids into a GIS?

One of the most attractive components of the National Digital Forecast Database is the geospatial nature of the data. The database is based on a 5km national grid that covers the Continental U.S. and separate grids that cover Hawaii, Alaska, the U.S. Virgin Islands, and Puerto Rico. Each 5km grid cell has forecast information so that a point specific forecast can be generated for any cell based on geographic coordinate location. Besides being able to just view the grids using algorithms to create graphics of the gridded information, more advanced users may want to perform analysis with gridded data to answer some real-world problems. Bringing the NDFD gridded files into a GIS enables the user to not only display the forecast elements with other georectified datasets such as satellite imagery, aerial photographs, and planimetric layers such as political boundaries, road networks, buildings, etc..., but also to query the data and use it for geospatial analysis. The result is essentially a real-time and forecast decision support tool for making critical decisions based on various weather elements. This is the case for marine interests as well, as the NDFD grid extend offshore several miles and deliver wave and wind information. Using the NDFD data in a GIS gives the flexibility to deal with either Raster versions of the NDFD grids (floating point grids), or vector versions (ESRI shapefiles) as well as other formats that are just recently becoming importable into GIS like NetCDF files and GRADS. The best way to illustrate the power of using NDFD grids in a GIS can best be presented via a use case scenario given below.

Using NDFD grids for pre-Hurricane landfall decision making

During the 2004 hurricane season NDFD forecast elements were used to display experimental forecast elements such as wind speed, wave heights, and quantitative precipitation forecasts along with hurricane forecast tracks in a map format that was used by DHS/FEMA for risk analysis at the FEMA Region IV Regional Operation Center and Disaster Field Office. For hurricanes Charley, Frances, Ivan, and Jeanne maps were created showing NDFD forecast elements overlaid on relevant political boundaries, roads, shoreline, and major population centers. The elements gave DHS/FEMA risk analysts an idea of the spatial coverage and intensity of forecast winds and wave heights. These maps were used to create the Presidential Briefing Package in which DHS/FEMA briefs the executive branch on potential damages that will be incurred from the approaching storm so as to pre-secure federal resources for response and aid through a presidential disaster declaration. This is an example of how having the NDFD grids converted to GIS significantly benefited the decision making process for weather driven natural disasters such as hurricanes. See Figure 1 and 2 below.

Start GIS_UsersCon_NON_Int ... Untitled - ArcMap - ArcView Using NDFD gridded d... GIS users conference Internet 100% 9:22 PM

- + Hawaii :: Need to Download
- + Guam :: Need to Download
- + Alaska :: Need to Download
- + North Hemisphere (AWIPS 227) :: Need to Download
- + Pacific North West :: Need to Download
- + Pacific South West :: Need to Download
- + Northern Rockies :: Need to Download
- + Central Rockies :: Need to Download
- + Southern Rockies :: Need to Download
- Northern Plains :: 15 days 1 hrs old
 - + Days1-7 :: 0 days 2 hrs old
 - Days1-3 :: 15 days 1 hrs old
 - ☐ Maximum Temperature :: 15 days 1 hrs old
 - ☐ Minimum Temperature :: Need to Download
 - ☐ PoP 12 :: Need to Download
 - ☐ Temperature :: Need to Download
 - ☐ Dew Point Temperature :: Need to Download
 - ☐ Weather :: Need to Download
 - ☐ QPF :: Need to Download
 - ☐ Snow Amount :: Need to Download
 - ☐ Wind Direction :: Need to Download
 - ☐ Wind Speed :: Need to Download
 - ☐ Wave Height :: Need to Download
 - ☐ Sky :: Need to Download
 - ☐ Apparent Temperature :: Need to Download
 - ☐ Relative Humidity :: Need to Download
 - ☐ Wind Gusts :: Need to Download
 - ☐ Incr. Prob. Trop. Cyclone Wind > 34kts :: Need to
 - ☐ Cum. Prob. Trop. Cyclone Wind > 34kts :: Need to
 - ☐ Incr. Prob. Trop. Cyclone Wind > 50kts :: Need to
 - ☐ Cum. Prob. Trop. Cyclone Wind > 50kts :: Need to
 - ☐ Incr. Prob. Trop. Cyclone Wind > 64kts :: Need to
 - ☐ Cum. Prob. Trop. Cyclone Wind > 64kts :: Need to

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Attempting to get
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extracting from W
Start Creating ima
Working on: Max
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Working on: Max
Working on: Max
7 images generat
Generating: north
with a reference c
Starting Browser:

- + Southern Rockies :: Need to Download
- Northern Plains :: 15 days 1 hrs old
 - + Days1-7 :: 0 days 2 hrs old
 - Days1-3 :: 15 days 1 hrs old
 - ☐ Maximum Temperature :: 15 days 1 hrs old
 - ☐ Minimum Temperature :: Need to Download
 - ☐ PoP 12 :: Need to Download
 - ☐ Temperature :: Need to Download
 - ☐ Dew Point Temperature :: Need to Download
 - ☐ Weather :: Need to Download
 - ☐ QPF :: Need to Download
 - ☐ Snow Amount :: Need to Download
 - ☐ Wind Direction :: Need to Download
 - ☐ Wind Speed :: Need to Download
 - ☐ Wave Height :: Need to Download
 - ☐ Sky :: Need to Download
 - ☐ Apparent Temperature :: Need to Download
 - ☐ Relative Humidity :: Need to Download
 - ☐ Wind Gusts :: Need to Download
 - ☐ Incr. Prob. Trop. Cyclone Wind > 34kts :: Need to
 - ☐ Cum. Prob. Trop. Cyclone Wind > 34kts :: Need to
 - ☐ Incr. Prob. Trop. Cyclone Wind > 50kts :: Need to

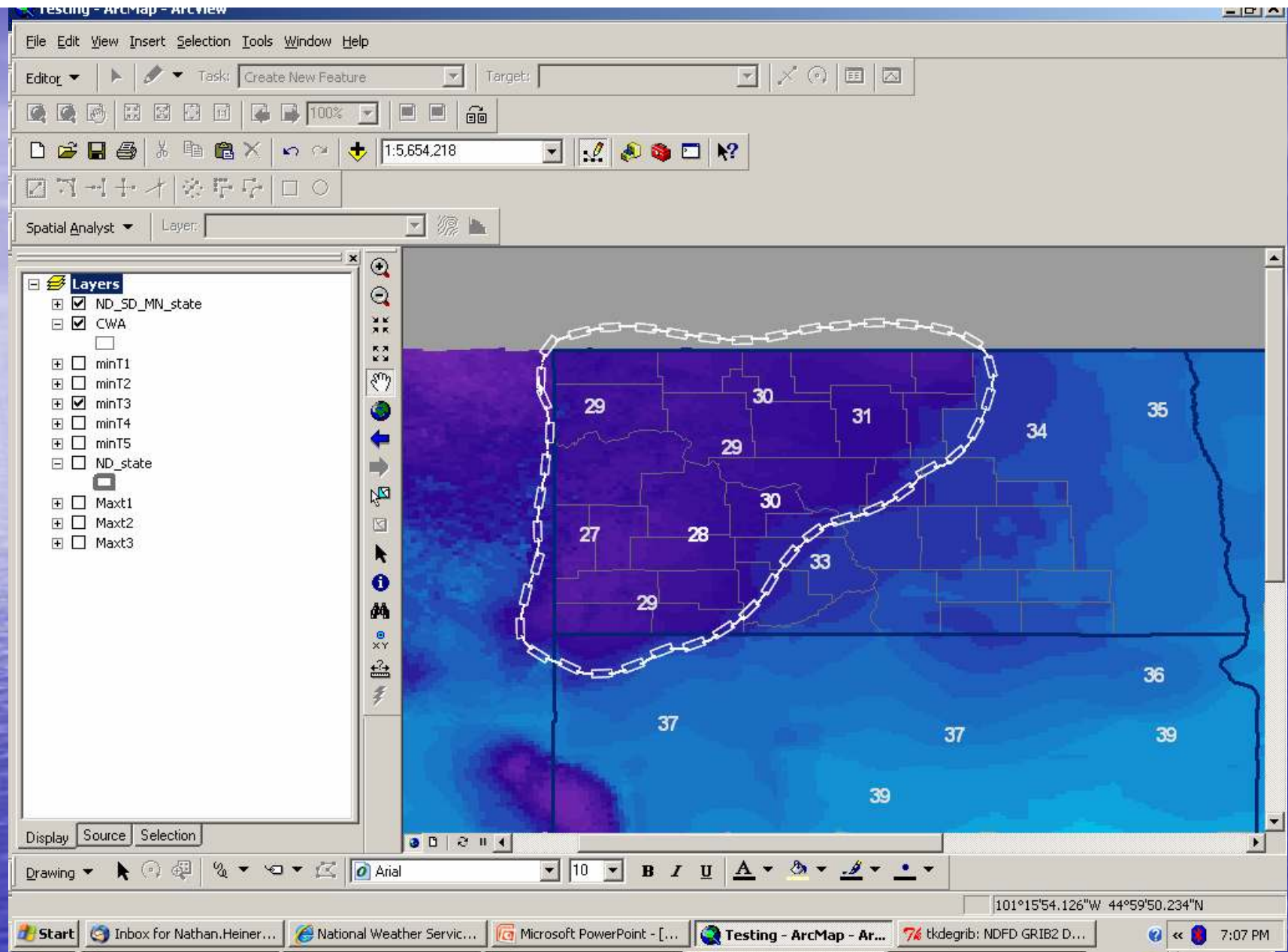
100 %

Download by ftp

Download by http (faster?)

Draw Images

Cancel Action



This process can also be automated via command line

Other NDFD Links

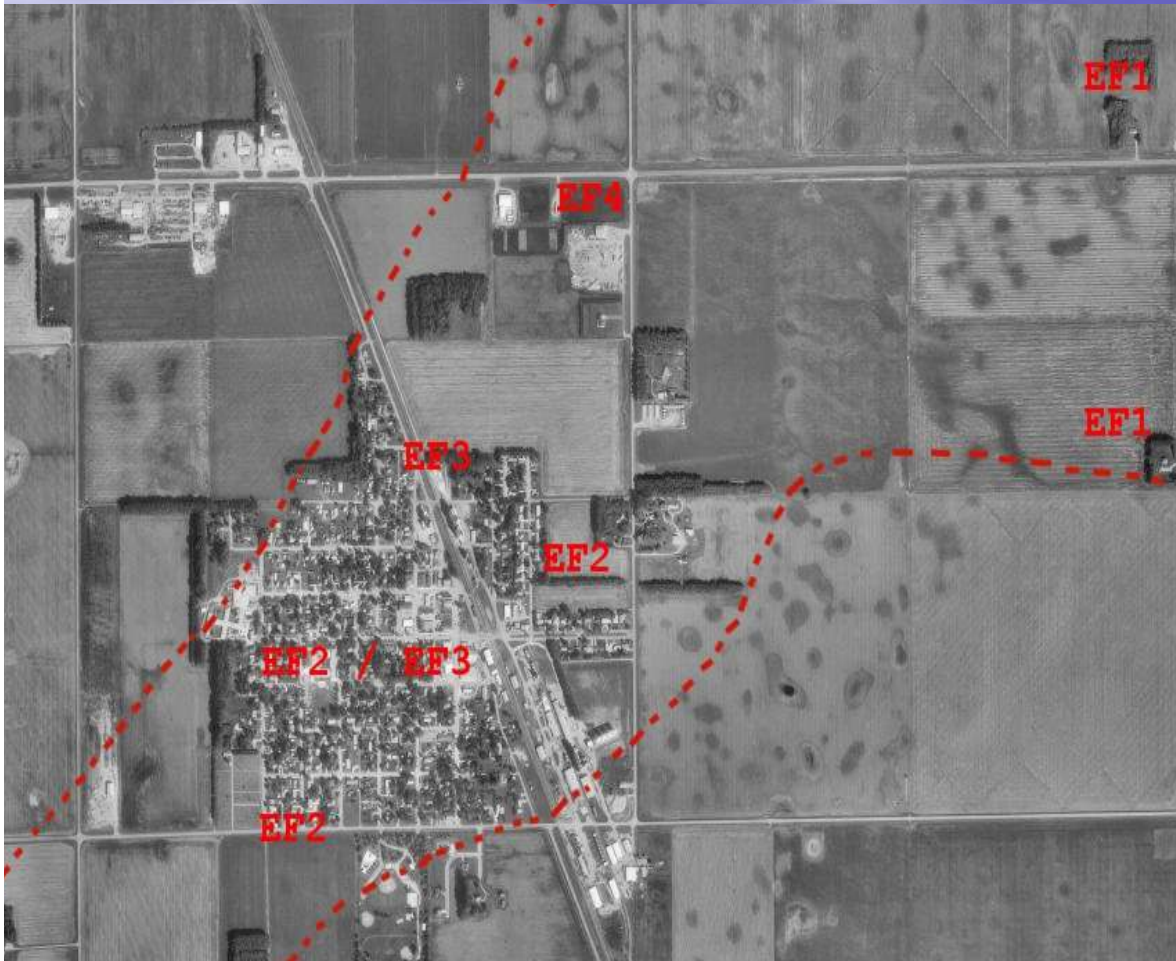
[www.weather.gov/ndfd/briefings/NDFDWkshp_CSC_GIS
andNDFD_final.ppt](http://www.weather.gov/ndfd/briefings/NDFDWkshp_CSC_GIS_andNDFD_final.ppt)

<http://www.prh.noaa.gov/regsci/gis/shapefiles/ndfd/>

- To Download the deGRIB GUI

http://www.weather.gov/mdl/NDFD_GRIB2Decoder/download.php

Summer and Winter Storm Data

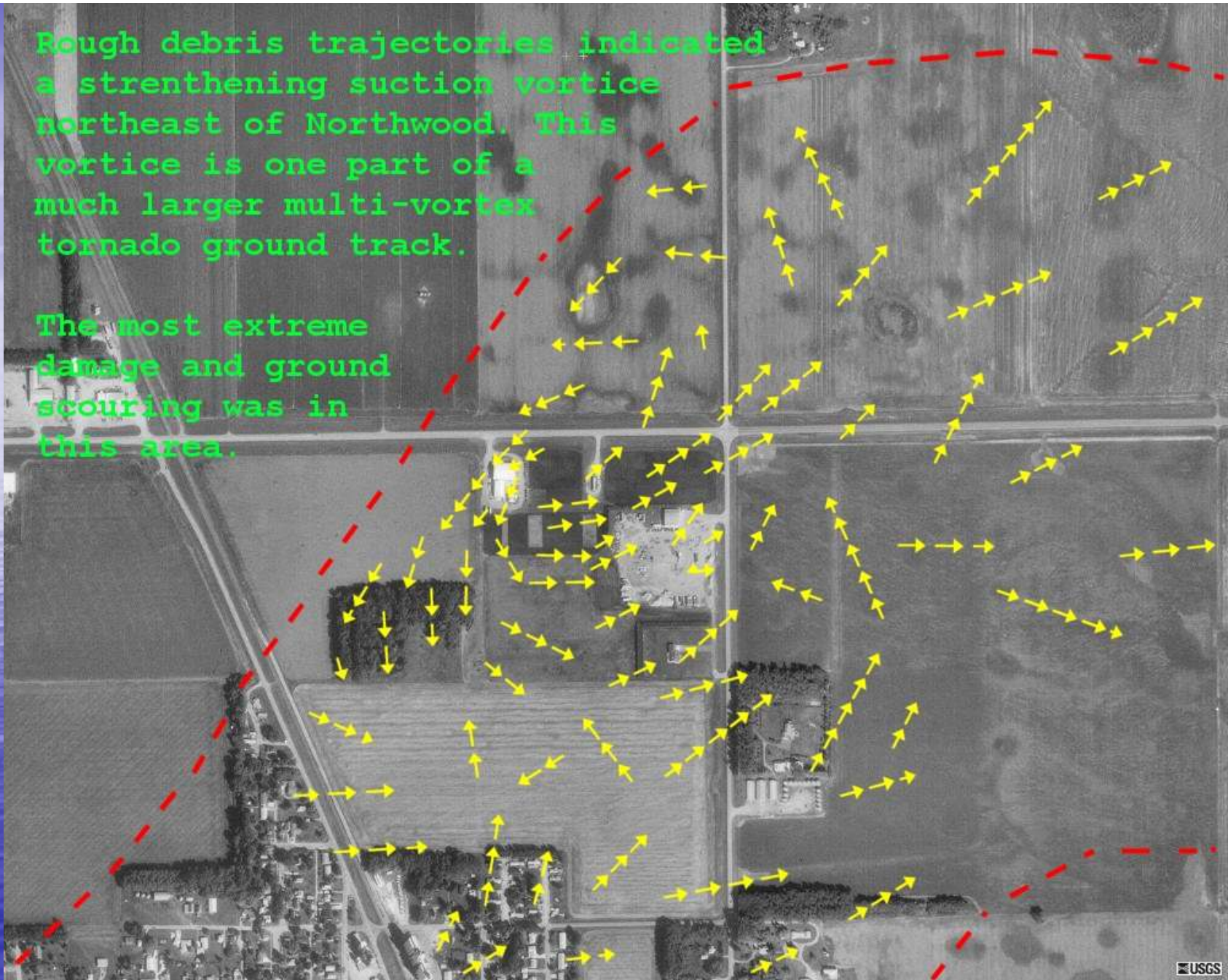


- Northwood tornado damage assessment
- Utilization of GPS and aerial photography in storm surveys

Courtesy of the Grand Forks National Weather Service Office

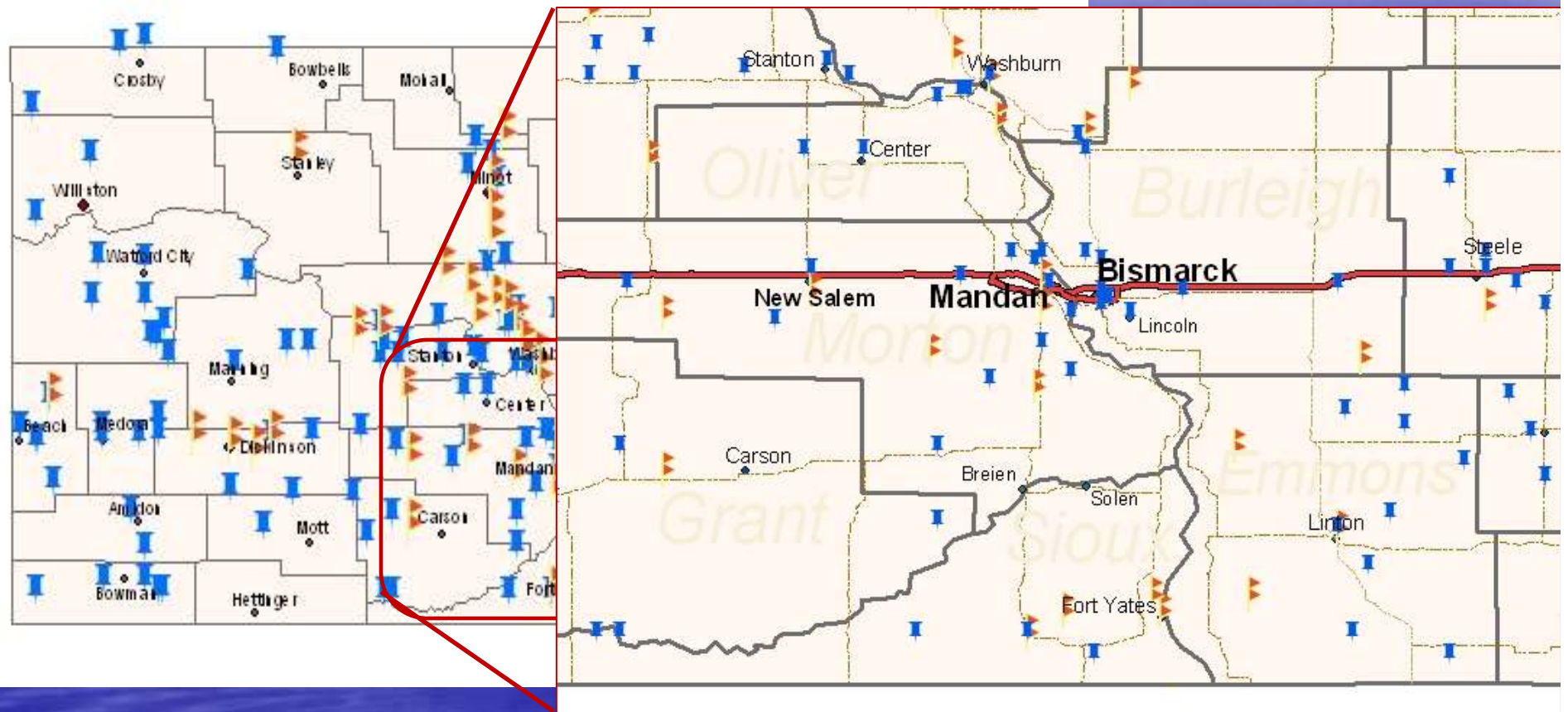
Rough debris trajectories indicated a strengthening suction vortice northeast of Northwood. This vortice is one part of a much larger multi-vortex tornado ground track.

The most extreme damage and ground scouring was in this area.

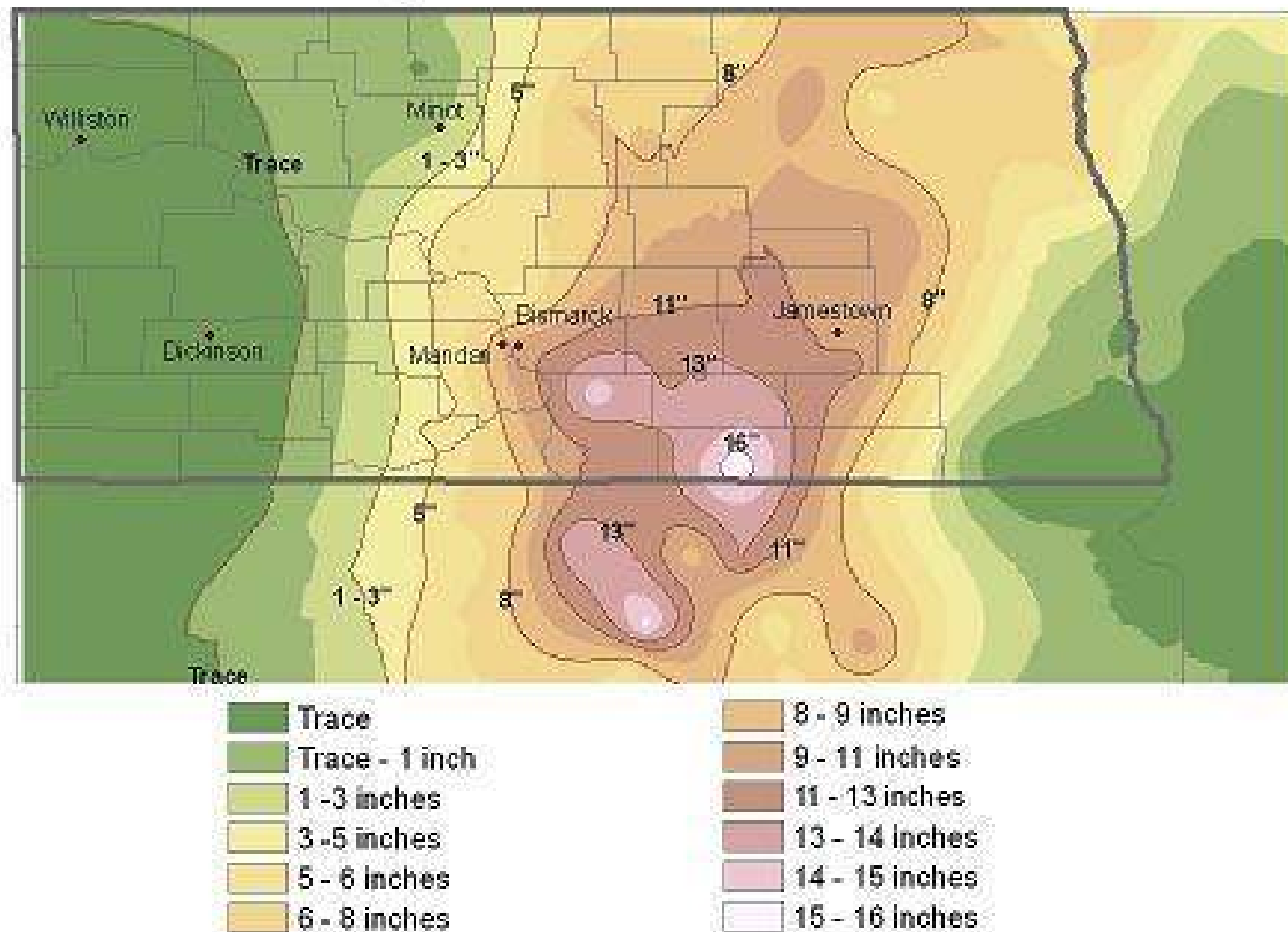


Courtesy of the Grand Forks National Weather Service Office

Severe Hail and Thunderstorm wind reports



Total Storm Snowfall Amounts Saturday December 30th - 2006



The End...

Come and visit us sometime!!

Any Questions?



nathan.heinert@noaa.gov

701-250-4224